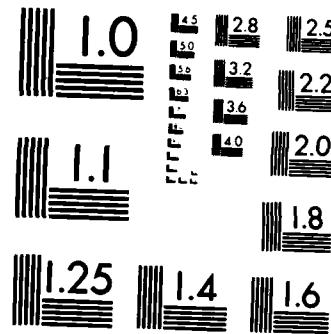


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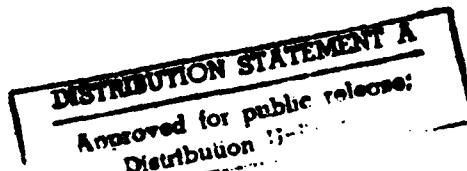
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TITLE: POLARSTERN - A SHIP OF SUPERLATIVES

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POLARSTERN - A SHIP OF SUPERLATIVES

/71

[De Jong, Ernst; Marine-Rundschau, B 20113 E, pp. 77 - 78; German]

With the POLARSTERN, the Federal Republic of Germany may well have achieved a leading position in the development of icebreakers. "We were able to build a ship similar to those which the Japanese build, and we built it faster and cheaper", stated Professor Dr.-Ing. Otto Krappinger, the chief executive officer of the Hamburgische Schiff-Bau-Versuchsanstalt GmbH, at the occasion of the delivery voyage of the POLARSTERN. The similar ship is the Japanese SHIRASE, which cost 350 million DM, which at 22,065 KW/30,000 HP has to expend considerably more power and produces less effective power than the POLARSTERN, which cost 190 million DM at 14,116 KW/19,200 HP.

The floating research station chartered by Hapag-Lloyd with homeport Bremen is however not intended to perform any icebreaking functions in the actual sense, but is designed to make its own way through the ice. The typical icebreaker does not carry a cargo; the POLARSTERN with its icebreaking hull developed by the Hamburgische Versuchsanstalt (HSVA) is coincidentally designed as a supply ship and is intended with this intent to supply the German (FRG) Polar Research Station in The Antarctic with fuel, food and equipment.

The research equipment on board appears to be inexhaustible and provides the scientists with equipment for oceanography, meteorology, marine biology, fish biology, sea geophysics, sea geology air and sea chemistry, glaciology, communications and ship technology.

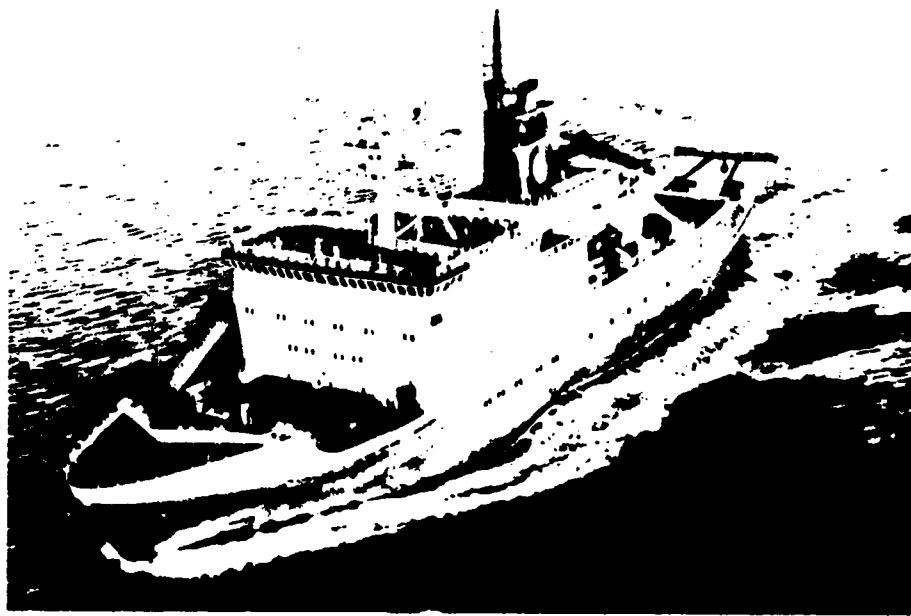
The ship ordered by the Bundesministerium für Forschung und Technologie (Federal Ministry for Research And Technology) was constructed in a building time of 16 months by the Arbeitsgemeinschaft (consortium) Howaldtswerke-Deutsche Werft AG (HDW), Kiel, with the Shipyard Nobiskrug, Rendsburg. HDW provided the hull, while Nobiskrug performed the construction, coordination and testing of the extensive equipment and installation of the ship, including the engine construction, the electro-technology and the scientific equipment.

The POLARSTERN, which will operate approximately 80 days per year in the Arctic and ca. 180 days in the Antarctic, has measurements of 118.00/102.02 m length, 25.00 m beam, vertical height to the main deck 13.60 and a draft of 10.50 m, 10,970 BRT and has a cargo capacity of 3,900 tons.

For reversible medium-speed motors with each 3,529 kW/4,800 HP operate over two Ren Double-Reduction Gears on two four-blade Escher-Wyss variable-pitch propellers of chromium-nickel steel in Kort nozzles at 180 min^{-1} for 16 knots.

Two diesel generators supply the the on-board power system each with 1,290 kW/1,500 kVA at 750 min^{-1} together with two AEG-shaft-driven generators each with 2,500 kVA at $1,100 - 1,400 \text{ min}^{-1}$ and a 450 kW/560 kVA emergency generator set at $1,500 \text{ min}^{-1}$.

At full engine power the ship can navigate through 1 meter thick ice at 5.5 knots and can go through ice thicknesses up to 2 meters at 2 knots by ramming. A Jastram-jet bubbling system at several points in the foreship, which blows out an air-water mixture, reduces the operating resistance in the ice. The ship hull corresponding with external plate thicknesses up to 43.5 mm the Canadian ice class Arc 7. To date there has been no ship with a higher class rating.

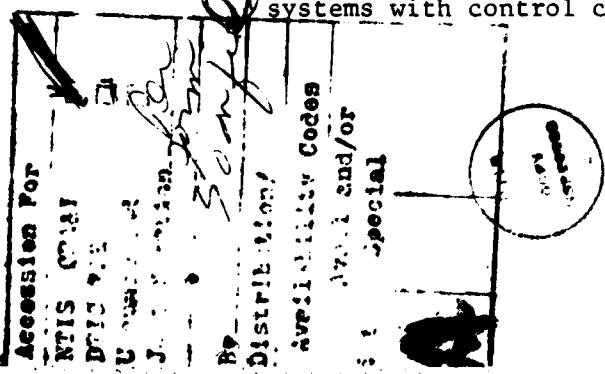


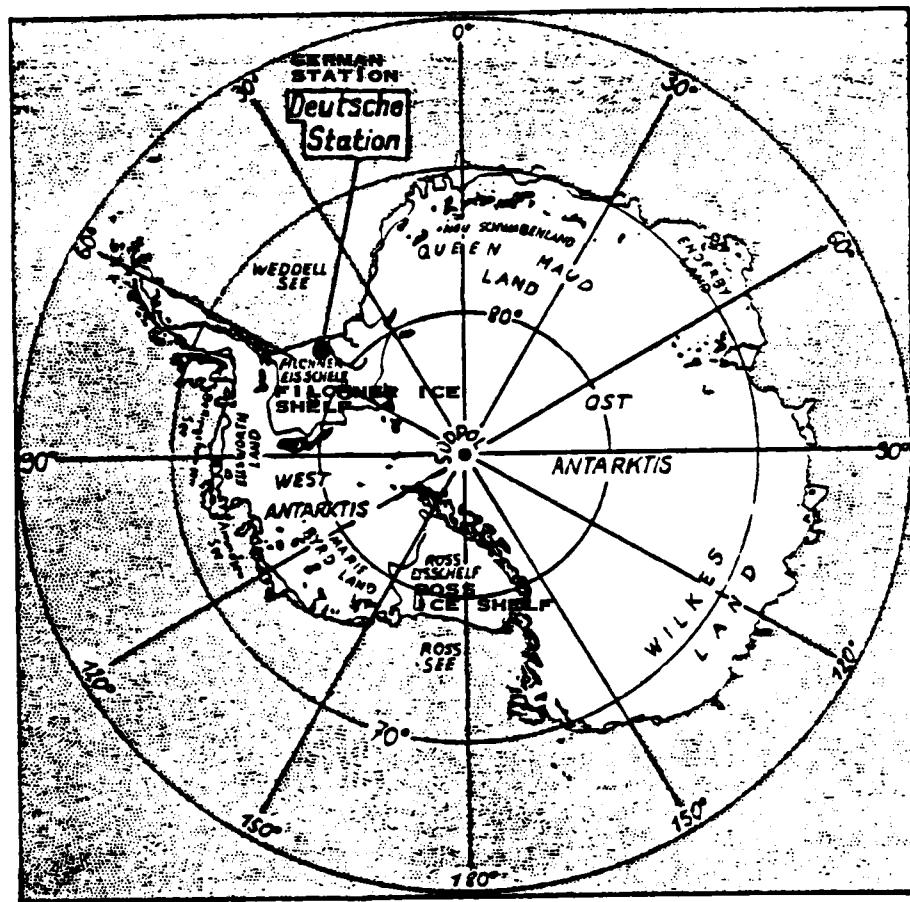
The POLARSTERN, the best ship of the international research fleet is name after the lodestar. Currently the ship is on its maiden voyage to the Antarctic to the German (FRG) Georg-von-Neumayer Station.

A KaMeWa-lateral thrust propellar on the bow and the stern each with 150 kW thrust improves the maneuvering characteristics and for ship stabilization an AEG-HDW fin-stabilization system is used and an Intereng pitch and roll attenuation system.

FUTURE NAVIGATION TECHNOLOGY IS INSTALLED IN THE POLARSTERN

The large all-around bridge has an extraordinarily large amount of modern equipment, which was specially configured and to an extent is newly designed. It has inter al. a newly developed three-axis gyrocompass-stabilized platform-double system of the "GHS 4" type by Anschütz with navigation data dissemination. The system, which is designed in accordance with the regulations for shock, vibration, power supply, environment and EMV (electromagnetic vulnerability), is used for special equipment of ship management and scientific activities, which require exact course a position information even during extreme ship motion. In addition, an integrated navigation system is provided, which processes the position, course and speed measurement data received from various satellite and radio navigation systems. In addition, there is a large number of various fathometer (sonic echo finder) systems for navigation, fishery operations and science, inter al., a 24-kHz panoramic echo sounder. All fathometer displays are shown both on the bridge and in the scientific laboratory. The Prakla-Seismos GmbH provided the integrated navigation system and the Form IBAK/Hagenuk provided the general radio equipment; Honeywell/Elac is responsible for the fathometer systems with control center.



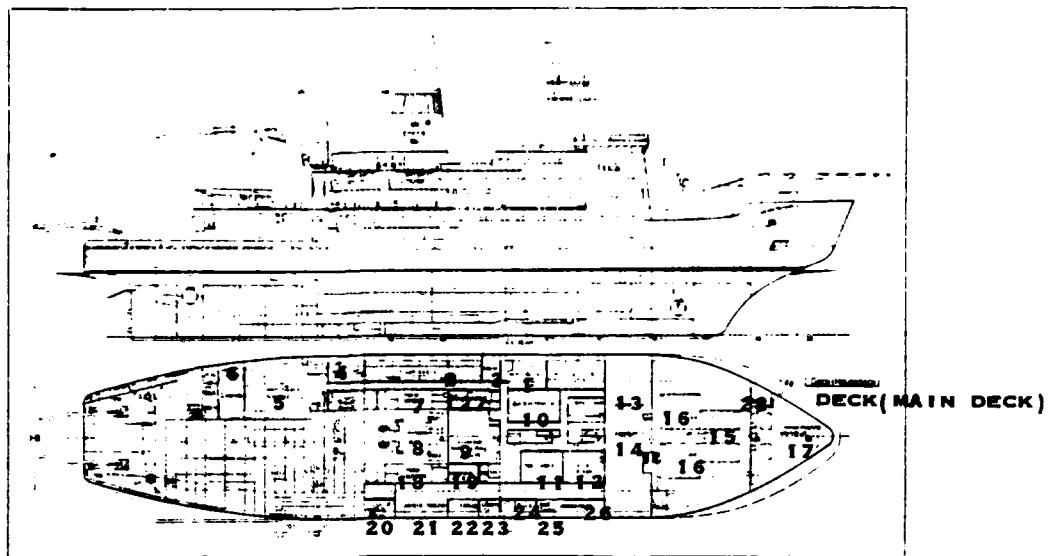


The construction diagram illustrates the operation area of the POLARSTERN in the Weddell Sea of the Antarctic (left above).

For control in maneuvering and positioning the ship in stationing activities, along-side maneuvering and navigating difficult water, a so called Joystick system of AEG is installed, a single-lever control, which with a computer applies on an optimal basis the desired power and direction of thrust of variable pitch propellers and the two lateral thrust propellers and the action of the rudder in regard to current and wind drift. The joystick can be operated from the bridge, the wing of the navigating bridge, the crow's nest and the winch control station. In regard to communications equipment the ship has in addition to a powerful radio station a Marisat-satellite communications system by the Firm Dornier, which is also installed at the German (FRG) Antarctic Research Station.

Underwater in the hull observation ports are provided in front of the propeller nozzles and ice-pressure measuring pockets are provided at the waterline.

The accommodations, which are designed for 106 persons, are designed for 36 crewmembers, 40 scientists and 30 replacement personnel for the Polar Station. The scientists have available on board a wet laboratory, a dry laboratory which can be divided into four sections, two chemical laboratories, a fishery- and air-chemistry laboratory. In addition, connections for additional laboratory containers and measurement and registration rooms and an on-board computer center are provided on the upper deck.



The lateral section of the new polar research and supply ship POLARSTERN (10,970 BRT) shows clearly the stem cut-up angle, the frame rake and water line run-in angle of the foreship

1 - Engineering office	15 - Cargo room
2 - Dry laboratory	16 - Hatch
3 - (illegible)	17 - Carpenter's workshop
4 - Measurement and registration room	18 - Motor shaft
5 - Multipurpose wet laboratory	19 - Magnetic-insulation room
6 - Tank room	20 - Evacuation room
7 - Motor shaft	21 - Equipment room
8 - Winch room	22 - Foul weather gear
9 - Universal measurement and registration room	23 - (illegible)
10 - On-board computer room	24 - Office
11 - Wet laboratory	25 - Telephone switchboard
12 - Chemical laboratory	26 - Luggage room
13 - Equipment room	27 - Photo laboratory
	28 - Stores

Work over the stern can be performed by means of a swivelling 300-kN crane. And over the side of the ship two beam cranes can be extended up to three meters for 200 or 50 kn payload.

The after work deck and the helicopter pad are provided with a 15-ton special crane with a maximum radius of 24 meters. On the foreward starboard side there is a 25-ton crane and on the forecastle there is a 10-ton crane extending over the foreship for unloading bulk supply goods. On the port stern side a core loading device is provided for ground samples (cores) and a launchway for air guns (energy source for reflection seismology at sea) for geophysical analysis and over the stern heavy fishery gear can be deployed. Various deck areas provide space for up to 12 laboratory and equipment containers of 20-foot size. A part of the work deck can be heated when the temperature is low. The external insulation and heating is designed for an outside temperature of up to 50°.

The double-hulled ship body and the narrow water-tight compartmentation increase the anti-sinking safety and the leak stability considerably beyond the minimum values required in the regulations. The electrical power in the event of damage is insured by the compartmentation of the engine room system into a main motor room with the propulsion machines and shaft generators and an auxiliary diesel room. Three closed motor boats each accommodating 50 persons are provided for rescue (shipwreck) and the 12-meter long research launch can be used as a reserve lifeboat.

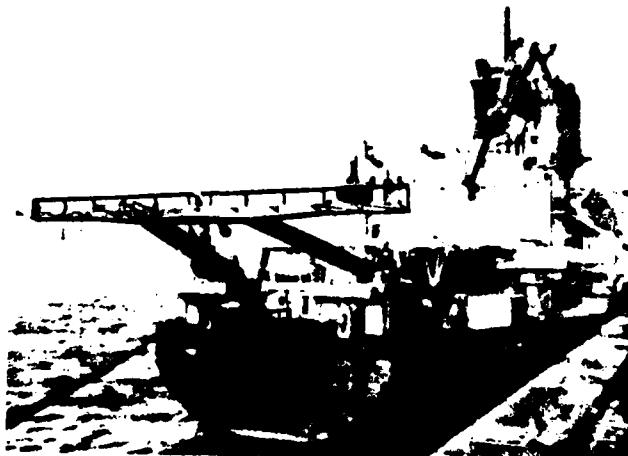
COURSE ANTARCTIC

[Merchant Marine Section; Marine-Rundschau B 20113 E, March 1983, p. 148; German]

□ On 27. December the new German (FRG) polar research ship POLARSTERN departed in its first trip to the Antarctic. After delivery of the new construction to the Alfred-Wegener-Institut für Polarforschung (Institute for Polar Research) on 9. December the POLARSTERN had conducted trials in the North Sea and was equipped for the trip to the Antarctic at the Bremerhaven Columbus Dock. For a following docking at the Hapag-Lloyd Shipyard dredging operations had to be performed in the harbor, since because of its icebreaker hull the POLARSTERN has an extraordinarily large draft (10.5 m).



The POLARSTERN shortly before departure to the Antarctic. A 25-ton and 10-ton crane are behind the forward helicopter pad.



Stern chute and crane as on a stern trawler. Behind this on the starboard the work deck with extending beams and travelers and on the port side the after helicopter pad.

The POLARSTERN, which cost 190 million DM - the most remarkable German (FRG) ship building project since the nuclear-power freighter OTTO HAHN - is intended primarily to be used as a floating research station and also to supply the German (FRG) Georg-von-Neumayer Station on the Ekström ice shelf and polar field stations. In the ambitious polar research program of the Federal Republic of Germany the POLARSTERN will play a major role.

The technology of the ship and its scientific equipment were designed on this basis. /1

The icebreaker hull tested in model tests is designed to be able to navigate through 1-meter thick sea ice at 5.5 knots and the structural members are designed to withstand an ice pressure of 950 tons per m^2 (The outer skin is up to 43.55 millimeters thick).

The scientists, for whom there are 40 accommodations, will work in the areas of astronomy, biological sciences, geodesy, cartography, geology, geophysics, glaciology, air chemistry, high-atmosphere and extra-terrestrial physics, meteorology, fishery research and oceanography. For the purpose extensive scientific equipment is on board and numerous auxiliary equipment from helicopters to research launch are available.

In addition to 36 man crew, the POLARSTERN can carry an additional 30 personnel for the research stations. The 118 meter long and 25 meter wide ship has a draft of 10.5 meters and a cargo capability of 3,900 tons.

Whether or not the ambitious expectations for the POLARSTERN will be realized will be determined at the latest in April, when the ship is expected back from its first Antarctic expedition in its home port Bremerhaven.

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